



**FISH TISSUE
COMPOSITING AND SHIPPING SOP**

**ROUND 1
PORTLAND HARBOR RI/FS**

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TABLE OF CONTENTS

Introduction.....	1
Sample Compositing.....	1
Human Health Risk Assessment.....	3
Ecological Risk Assessment	3
Communications	4
Compositing.....	5
Shipping Field Samples	5
References.....	8

LIST OF FIGURES

Figure 1. Field Data Reporting Table

LIST OF TABLES

Table 1. Fish Collection for the Human Health Risk Assessment at the Willamette River.
Table 2. Fish Collection for the Ecological Risk Assessment at the Willamette River.

INTRODUCTION

Compositing and shipment of fish collected to support the Portland Harbor RI/FS were previously described in the Round 1A Field Sampling Plan (FSP) (SEA et al. 2002a), and the Round 1 FSP (SEA et al. 2002b). This standard operating procedure (SOP) modifies and clarifies the procedures previously presented. The procedures described in this SOP are in accordance with U.S. Environmental Protection Agency (EPA) guidance (EPA 2000).

Separate SOPs for the fish tissue sample collection and tissue sample homogenization for the Portland Harbor RI/FS have been provided to EPA under separate cover (SEA et al. 2002c, SEA 2002).

SAMPLE COMPOSITING

Fish¹ used in a composite sample:

- Will be of the same species
- Will be from the sample locations defined in the FSP and any subsequent modifications agreed upon by the LWG and EPA
- Will be of the same tissue type (i.e., fillet or whole body)

To the fullest extent possible², fish used in a composite sample also:

- Will satisfy any legal requirements of harvestable size or weight, or be of consumable size if no legal harvest requirements are in effect
- For HHRA, will be of similar size so that the smallest individual in a composite is no less than 75% of the total length (size) of the largest individual
- For HHRA, will be collected as close to the same time as possible, with a target range of no more than 1 week apart
- Will be collected in sufficient numbers to provide a composite homogenate sample. The minimum composite mass needed for HHRA sample analysis is 300g and the minimum mass needed for ERA samples is 150g. In most cases, more mass per sample

¹ The term fish is used generically in this SOP and includes crayfish as well as finfish

² Due to the inherent difficulties in catching all target species and size classes in any field study, it is likely that some target catch goals will not be attainable. When this occurs, the LWG will closely coordinate alternative, best-case, compositing and/or analysis scenarios with EPA.

will be collected to support requisite QC/QA analyses and also to provide extra tissue for archiving and possible reanalysis. Only at sites and for species that repeated fishing attempts fail to collect extra biomass will the minimum 300g and 150g biomass targets be collected.

A composite will consist of individual fish that meet the criteria stated above and are grouped. They will be packaged together in the field lab for shipment to Axys for homogenization and will be considered one composite sample. The homogenization process will consider these fish one analytical sample, i.e., there will no homogenized samples of individual fish.

During the Round 1 sampling activities, fish will be collected first within the ISA using boat electrofishing. Alternative collection methods will then be used to collect additional target fish species, if necessary, and to collect fish in upstream areas. Collection methods are described in the Round 1 Field Sampling Plan.

After the target number of individual fish for a given species has been collected, a compositing scheme will be developed for that species. The compositing scheme will consider the following:

- Species
- Total length
- Total weight (in the case of lamprey ammocoetes and juvenile salmonids)
- Sample location (including river mile, fish zone, and GPS coordinates)
- Date/Time of collection (for HHRA samples).

Tabular and mapped summaries of the field collection and field laboratory data will be provided to EPA weekly. When a compositing scheme has been identified by the LWG team, the proposed scheme will be presented to and discussed with EPA and their written approval obtained before the proposed compositing scheme is implemented. Due to analytical holding times, it is critical that EPA complete their review of LWG compositing schemes within one week of their receipt.

If the target number of individual fish cannot be obtained within the ISA after a number of attempts, including the use of alternative fishing methods (e.g., both electrofishing and hook and line), and based on the best professional judgment of the fish collection contractor (Ellis Ecological Services), then EPA will be notified of the situation and alternative species and/or size ranges will be discussed based on the size

and type of fish that can be collected in the field. The LWG will prepare a memo to EPA summarizing the fishing efforts and the proposed modification. Both optimal and alternative target size ranges for HHRA target species are included in Table 1.

The compositing schemes will be developed for fish collected within the ISA prior to developing plans for fish collected outside of the ISA. The same criteria as those used within the ISA will be used to develop the compositing schemes for fish collected outside of the ISA.

Human Health Risk Assessment

Exposure scenarios for human receptors are based on ongoing, repeated fish consumption. Therefore, composite samples will be analyzed because this type of sample is most representative of potential human exposures. The use of a composite sample to evaluate potential risks to human health is in accordance with EPA guidance (EPA 2000). The use of composite samples will also help ensure adequate sample mass for the various analytical methods proposed for fish tissue.

The target fish species, sample locations, sample types, and size ranges identified for the HHRA composite samples are shown in Table 1. Alternate size ranges are also provided in Table 1. As discussed above, EPA will be consulted before selecting an alternative species or size range.

With the exception of smallmouth bass, three composite samples will be collected within each sample location for the HHRA target species. For smallmouth bass, three composite samples will be collected within three sample locations; one composite sample will be collected at all other sample locations. For all species and locations where multiple composites are collected, every attempt will be made to use a similar compositing scheme for each sample so that the composites can be considered replicates for that sample location. The compositing scheme will consider the criteria identified above and, whenever possible, each composite will consist of a combination of individual fish that are similar according to those criteria.

The following three types of samples will be used for HHRA species: whole body, fillet with skin and belly flap, and fillet without skin. Composite samples will be developed using the same sample type.

Ecological Risk Assessment

Target fish species were selected to assess exposure to fish as both a receptor and a prey item for other fish, birds, and mammals. Composite samples will be analyzed because this type of sample is most representative of potential ecological exposures. Using a composite sample to evaluate potential ecological risks is in agreement with EPA guidance (EPA 2000). The use of composite samples will also ensure adequate sample mass for the various analytical methods proposed for fish tissue.

The target fish species, size, weight, number of individuals, and total composite mass are identified for the ERA composite samples in Table 2. The number of individual fish collected may vary in order to ensure that the total composite mass meets the minimum total composite mass, which is 150g for all target species except for sub-yearling Chinook salmon which is 100g. In most cases, 300g or more of biomass will be collected for each ERA composite sample.

One composite sample will be collected at each sample location for the ERA target species. All samples for the ERA will be whole body and the composite scheme will consider the criteria identified above.

Communications

Information from the daily fish sampling efforts will be provided to the HHRA and ERA task leaders to facilitate communication and prepare for compositing. Through these communications, the RA task leaders will be aware of potential difficulties in catching the required sizes and numbers of fish. Information that will be provided will include:

- Station location
- Sample identification code
- Number of attempts
- Sampling Method
 - Electrofishing
 - *Note in the comment section the number of fish, by species, floating after an event.*
 - trot-line
 - trap
- Target species obtained
 - Sizes and weight caught
 - GPS coordinates/corrected GPS coordinates
- By-Catch
 - Numbers and approximate sizes
 - GPS coordinates/corrected GPS coordinates
- Comments and Observations.

As soon as possible after being generated, field data will be entered into an excel spreadsheet (Figure 1) by the field crew, the field laboratory crew, and data

management office support staff (who receive scans of the field logbooks daily). The data types recorded are the column headers shown in Figure 1. As needed based on the catch rates, the field data spreadsheet will be sent to the HHRA and ERA task leaders. Based on the fish collection data, the HHRA and ERA task leaders will identify which fish will be combined into each composite sample. As described previously, in the event that the sampling effort is unable to meet the size requirements for certain species listed in Table 1 and Table 2, the EPA will be consulted regarding alternative compositing schemes. Once a compositing scheme is agreed upon and approved in writing by EPA, it will be transmitted to the field lab by filling out the Comp# field in the data spreadsheet (Figure 1). The field laboratory staff will prepare the composite sample for shipping as described below.

Compositing

Once the RA team leaders send confirmed compositing instructions to the Field Sampling Coordinator, the composite samples will be prepared. Two individuals will prepare the samples. The first will pull the samples from the freezer, regroup, re-label, and bind the composites together as one sample. The other will fill out the Chain-of-Custody (COC), double check the sample labels, and generate the new sample labels. This procedure is critical because the COC is broken and reformed.

Shipping Field Samples

Composited samples will be shipped to Axys for homogenization when there is a sufficient volume of samples to fill a cooler. The following steps will be followed when each cooler is shipped:

- Samples will be completely frozen prior to shipping (-20°C)
- Coolers will be medium sized (24"x14"x15"). They will be decontaminated/cleaned and identified with a cooler number
- Dry ice will line the bottom of the cooler
- Samples will be removed from the freezer, checked off the freezer log, and placed into a cooler
- The sample information will be noted on a new COC
- The top layer will be dry ice
- The weight of the cooler will not exceed 50 lbs for health and safety reasons
- A temperature blank will be added (this will be frozen as if it were a sample)
- Paperwork will be prepared (shipment, COC, and placards)

- New COC and copies of the original paperwork will be placed into a Ziploc bag and taped to the inside of the cooler lid.
- Placards will be taped to the cooler that state:
 - ↑ THIS SIDE UP ↑
 - Environmental Samples of No Commercial Value
 - In case of delay or emergency please contact Janet Cloutier 360-705-3534 or Ian Stupakoff 206-419-0809
 - Fragile, Handle with Care
 - Samples Must Remain Frozen
- Each cooler will be custody sealed on the three sides that open, taped around the girth and width, and placed into a freezer for holding until picked up by FEDEX.

Shipping by FEDEX is the preferred method to the Axys laboratory in Sydney, BC (Canada). The coolers will be delivered to the local FEDEX and processed with international shipping papers. These contain a FEDEX weigh bill and a Commercial Invoice. The FEDEX weigh bill will act as an extension of the COC. The persons shipping the coolers will retain a copy of the weigh bill and either email or fax a copy of the weigh bill (that contains the tracking number) to the Chemistry QA manager upon shipping. The original will be provided to SEA for incorporation in the final data package. Samples will be shipped in the middle of the week to ensure that weekend delays are avoided.

The Field Lab Coordinator will notify Axys when samples are shipped, including the FEDEX tracking number(s). The Chemistry QA Manager will also be notified. Axys will notify these same individuals upon receipt of the coolers from the field lab. Confirmation emails will be sent using the following addresses:

Janet Cloutier - LWG Chemistry QA Manager, Olympia, WA: jcloutier@striplin.com 360-705-3534

Dr. Coreen Hamilton - PM Axys Laboratory, Sydney, BC: chamilton@axys.com 250-655-5800

Tom Schulz - LWG Field Lab Coordinator, Olympia, WA; tschulz@striplin.com 360-705-3534.

Finally, it is critical that the samples be shipped and received frozen ($\leq 0^{\circ}\text{C}$). Samples will be packed and shipped on dry ice. This should ensure that samples arrive below -20°C . If a cooler arrives $> 0^{\circ}\text{C}$ but $\leq 4^{\circ}\text{C}$, it will be assumed that the hold time will start from the time it was packaged. All labs are to notify the chemistry QA manager upon receipt of such non-conforming samples immediately.

Upon notification, the chemistry QA manager will notify the field QA manager and the CERCLA coordinator. If a cooler arrives $> 4^{\circ}\text{C}$, the same notification process will ensue. The CERCLA project coordinator will consult with the EPA QA manager prior to making a decision about analyzing such samples.

REFERENCES

Striplin Environmental Associates, Inc. 2002. Fish Tissue Homogenization and Shipping SOP, Round 1 Portland Harbor RI/FS, Draft. Prepared for The Lower Willamette Group, Portland, OR.

Striplin Environmental Associates, Inc.; Windward Environmental LLC, Anchor Environmental, LLC, and Kennedy/Jenks Consultants. 2002a. Field Sampling Plan Round 1A Portland Harbor RI/FS, Draft. Prepared for Lower Willamette Group, Portland OR.

Striplin Environmental Associates, Inc., Windward Environmental LLC, Anchor Environmental, L. L. C., and Kennedy/Jenks Consultants. 2002b. Round 1 Field Sampling Plan Portland Harbor RI/FS. Prepared for The Lower Willamette Group, Portland, OR.

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U.S. EPA. (Environmental Protection Agency). 2000. Guidance for assessing chemical contaminant data for use in fish advisories, Volume 1 - Fish sampling and analysis. Third Edition. EPA 823-B-00-007. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

[illegible]

Table 1 Fish Collection for the Human Health Risk Assessment at the Willamette River.

Sample Location ^a	Species	Primary Collection Method	Sample Type	Number of Composites	Number of Individual Fish per Composite	Total Number of Individual Fish	Optimal Size Range mm (in)	Alternate Size Range mm (in)
RM 3	Smallmouth Bass ^b	Boat electrofishing	Whole Body	3	5	15	266-355 (10.5-14)	225-300 (9-12)
RM 4	Smallmouth Bass ^b	Boat electrofishing	Fillet	1	5	5	266-355 (10.5-14)	225-300 (9-12)
		Boat electrofishing	Whole Body	1	5	5	266-355 (10.5-14)	225-300 (9-12)
RM 5	Smallmouth Bass ^b	Boat electrofishing	Fillet	1	5	5	266-355 (10.5-14)	225-300 (9-12)
		Boat electrofishing	Whole Body	1	5	5	266-355 (10.5-14)	225-300 (9-12)
RM 6	Smallmouth Bass ^b	Boat electrofishing	Whole Body	3	5	15	266-355 (10.5-14)	225-300 (9-12)
RM 7	Smallmouth Bass ^b	Boat electrofishing	Fillet	1	5	5	266-355 (10.5-14)	225-300 (9-12)
		Boat electrofishing	Whole Body	1	5	5	266-355 (10.5-14)	225-300 (9-12)
RM 8	Smallmouth Bass ^b	Boat electrofishing	Fillet	1	5	5	266-355 (10.5-14)	225-300 (9-12)
		Boat electrofishing	Whole Body	1	5	5	266-355 (10.5-14)	225-300 (9-12)
RM 8 5 ^c	Smallmouth Bass ^b	Boat electrofishing	Fillet	1	5	5	266-355 (10.5-14)	225-300 (9-12)
		Boat electrofishing	Whole Body	1	5	5	266-355 (10.5-14)	225-300 (9-12)
RM 9	Smallmouth Bass ^b	Boat electrofishing	Whole Body	3	5	15	266-355 (10.5-14)	225-300 (9-12)
RM 3-6	Black Crappie	Boat electrofishing	Fillet	3	5	15	225-300 (9-12)	200-266 (7.9-10.5)
		Boat electrofishing	Whole Body	3	5	15	225-300 (9-12)	200-266 (7.9-10.5)
	Carp	Boat electrofishing	Fillet	3	5	15	508-677 (20-26.5)	508-677 (20-26.5)
		Boat electrofishing	Whole Body	3	5	15	508-677 (20-26.5)	508-677 (20-26.5)
	Bullhead	Trotline	Fillet	3	5	15	225-300 (9-12)	225-300 (9-12)
		Trotline	Whole Body	3	5	15	225-300 (9-12)	225-300 (9-12)
	Walleye ^d	Boat electrofishing	Fillet	3	5	15	412.5-550 (16-21.5)	343-457 (13.5-18)
		Boat electrofishing	Whole Body	3	5	15	412.5-550 (16-21.5)	343-457 (13.5-18)
	Largescale Sucker ^d	Boat electrofishing	Fillet	3	5	15	375-500 (15-20)	375-500 (15-20)
		Boat electrofishing	Whole Body	3	5	15	375-500 (15-20)	375-500 (15-20)
RM 6-9	Black Crappie	Boat electrofishing	Fillet	3	5	15	225-300 (9-12)	200-266 (7.9-10.5)
		Boat electrofishing	Whole Body	3	5	15	225-300 (9-12)	200-266 (7.9-10.5)
	Carp	Boat electrofishing	Fillet	3	5	15	508-677 (20-26.5)	508-677 (20-26.5)
		Boat electrofishing	Whole Body	3	5	15	508-677 (20-26.5)	508-677 (20-26.5)
	Bullhead	Trotline	Fillet	3	5	15	225-300 (9-12)	225-300 (9-12)
		Trotline	Whole Body	3	5	15	225-300 (9-12)	225-300 (9-12)
	Walleye ^d	Boat electrofishing	Fillet	3	5	15	412.5-550 (16-21.5)	343-457 (13.5-18)
		Boat electrofishing	Whole Body	3	5	15	412.5-550 (16-21.5)	343-457 (13.5-18)
	Largescale Sucker ^d	Boat electrofishing	Fillet	3	5	15	375-500 (15-20)	375-500 (15-20)
		Boat electrofishing	Whole Body	3	5	15	375-500 (15-20)	375-500 (15-20)
Totals				79		395		

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August 28, 2002

Table 1. Fish Collection for the Human Health Risk Assessment at the Willamette River.

Sample Location ^a	Species	Primary Collection Method	Sample Type	Number of Composites	Number of Individual Fish per Composite	Total Number of Individual Fish	Optimal Size Range mm (in)	Alternate Size Range mm (in)
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^a Sample location is approximate. For single river miles, sample will be collected +/- 0.5 miles of the indicated location.^b Smallmouth bass will also be used as target species for the Ecological Risk Assessment.^c The sample designated as RM 8.5 will be collected within Swan Island Lagoon.^d Alternate target species (walleye for bullhead and largescale sucker for carp).

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Portland Harbor RI/FS Round 1, Fish Tissue Compositing and Shipping SOP

August 28, 2002

Table 2. Fish Collection for the Ecological Risk Assessment at the Willamette River.

Representative Species	Minimum Mass (g) Needed ^c	Target Size - minimum length (mm)	Target Weight of individuals (g) ^b	Number of individuals needed for composite
Benthic Invertebrates ^a	150	na	150	na
Crayfish	300	100	25	8
Lamprey ammocoetes	150	70	1	150
Largescale sucker	150	300	450	5
Peamouth	150	200	150	5
Subyearling Chinook salmon	100	90	7.5	14
Sculpin	150	90	9	17
Smallmouth bass	150	250	175	5
Northern pikeminnow	150	250	150	5

^a biota retained on 0.5 mm mesh sieve

^b The length-weight relationships for lamprey, largescale sucker, peamouth, sculpin, smallmouth bass, and northern pikeminnow are based on predicted weights from length-weight relationships published for similar species in Fishbase (www.fishbase.org) and confirmed with Bob Ellis (Ellis, Personal communication 2002). Subyearling Chinook data are from Ellis (Ellis, Personal communication 2002). Crayfish data are from samples taken in the Columbia River (Buck personal communication (2002)). Juvenile Chinook salmon yearlings data are from North (2002).

^c This is the minimum mass needed for a single laboratory analysis without QA.

na - not applicable